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Vítor João Pereira Domingues Martinho

Escola Superior Agrária, Instituto Politécnico de Viseu

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# NET MIGRATION AND CONVERGENCE IN PORTUGAL

Vitor João Pereira Domingues Martinho

Unidade de I&D do Instituto Politécnico de Viseu  
Av. Cor. José Maria Vale de Andrade  
Campus Politécnico  
3504 - 510 Viseu  
(PORTUGAL)  
e-mail: [ydmartinho@esav.ipv.pt](mailto:ydmartinho@esav.ipv.pt)

## ABSTRACT

This work aims to present a project of research about the identification of the determinants that affect the mobility of labor from 1991 to 2001 (at NUTs III level). As main conclusion it can be said which is confirmed the existence of some labor mobility in Portugal and that regional mobility is mainly influenced positively by the availability of housing. This study analyses, also, through cross-section estimation methods, the influence of spatial effects in the conditional product convergence in the parishes' economies of mainland Portugal between 1991 and 2001. Taking into account the estimation results, it is stated that there are not indications of convergence (the population is in the littoral of Portugal) and it can be seen that spatial spillover effects, spatial lag and spatial error condition the convergence of product of Portuguese parishes in the period under consideration.

**Keyword:** net migration; convergence theory; panel and cross-section estimations; Portuguese regions.

## 1. INTRODUCTION

In this context, it appears that the current trend of several economic theories is to consider that the labor mobility accentuates regional disparities. Even writers in the line of neoclassical theory, as (1)Barro and Sala-i-Martin (1991), associated with endogenous growth theory, now admit that the mobility of labor reacts to processes of convergence and reduce regional disparities, but only if some conditions are met. That is, left to disappear the idea of absolute convergence for the same "steady state" of neoclassical influence, to a perspective of conditional convergence for different "steady states" (2)(Martinho, 2011a).

There is a variety of studies analysing conditional product convergence with spatial effects. Some authors has defended that the evidence of convergence across European countries as mentioned by Barro and Sala-i-Martin is due to the omission of spatial autocorrelation in their analysis and bias resulting from the selection of European regions. Following on, (3)Sandberg (2004), for example, has examined the hypothesis of absolute and conditional convergence across Chinese provinces in the period from 1985 to 2000 and found indications that there had been absolute convergence during the periods of 1985 to 2000 and 1985 to 1990. He has also found evidence that conditional convergence had been seen in the sub-period of 1990 to 1995, with signs of spatial dependency across adjacent provinces. (4)Arbia et al. (2004) have studied the convergence of gross domestic product per capita among 125 regions of 10 European countries from 1985 to 1995, considering the influence of spatial effects. They concluded that the consideration of spatial dependency considerably improved the rates of convergence. (5)Lundberg (2004) has tested the hypothesis of conditional convergence with spatial effects between 1981 and 1990 and, in contrast to previous results, found no clear evidence favouring the hypothesis of conditional convergence. On the contrary, the results foresaw conditional divergence across municipalities located in the region of Stockholm throughout the period and for municipalities outside of the Stockholm region during the 1990s (6)(Martinho, 2011b).

## 2. THE THEORETICAL MODELS FOR NET MIGRATION

We consider here, the models related to the migratory balance of (7)Salvatore (1977), (8)Katseli et al. (1989) and (9)Soukiazis (1995) and the models of the New Economic Geography of (10)Epifani et al. (2005). The choice of these models has to do with the fact that seem to be more closely aligned with the objectives set for this work initially just in the abstract. That is, models Salvatore (1977), Katseli et al. (1989) and Soukiazis (1995) are models simpler and can identify the determinants of labor mobility and the Epifani et al. (2005) is a more complete model that allows us to analyze the dynamics associated with the spatial evolution with implications for labor migration and unemployment.

The model estimated in this study is what is presented below in equation 1. Are represented in the model presented below some new factors, mentioned in the economic theory, such as the effects of congestion, through the availability of housing.

$$(SM / PA)_t = c_0 + c_1(r_I - r_E)_t + c_2(D_I - D_E)_t + c_3(A_I)_t + c_4(s_I - s_E)_t + c_5(f_I - f_E)_t \quad (1)$$

SM/PA = net migration from one country or region with the outside, as a percentage of total active population of the country or region;  
 $r_I - r_E$  = difference between the growth rates of real output, with  $r_I$  to be the annual growth rate of real output of the originating country or region and  $r_E$  being the average growth rates of real GDP in all countries or regions destination;  
 $D_I - D_E$  = difference between the internal unemployment rate and the external average;  
 $A_I$  = number of employees in agriculture of the country or region of origin;  
 $s_I - s_E$  = difference between the internal growth rate of wage and external average;  
 $f_I - f_E$  = difference between the internal growth rate of housing and external average.

$$(SM / PA)_t = c_0 + \rho(W(SM / PA)) + c_1(r_I - r_E)_t + c_2(D_I - D_E)_t + c_3(A_I)_t + c_4(f_I - f_E)_t + \varepsilon \quad (2)$$

$W$  = matrix of distances;

$\rho$  = autocorrelation coefficient (the component "spatial lag");

$\varepsilon$  = error term (the component "spatial error", and  $\varepsilon = \lambda W\varepsilon + \xi$ ).

The other variables and coefficients have the same meaning as that before.

In the estimates with spatial effects there are some spatial econometric techniques that are commonly used. In particular, the Moran's I statistic that is used to identify the existence of local and global spatial autocorrelation, the strategies of specification classical in six steps of (11) Florax et al. (2003) and LM tests to identify which form is most appropriate to the model specification, in other words, the component "spatial lag" (where the dependent variable is spatially lagged through the matrix  $W$ ), or the component with the "spatial error" (where the error term is spatially lagged).

### 3. MODEL OF CONDITIONAL CONVERGENCE WITH SPATIAL EFFECTS

Bearing in mind the theoretical considerations about conditional convergence, what is presented next is the model used to analyse conditional product convergence with spatial effects, at parishes' level in mainland Portugal:

$$(1/T)\log(P_{it}/P_{i0}) = \alpha + \rho W_{ij} p_{it} + b \log P_{i0} + \varepsilon_{it}, \text{ with } \alpha > 0 \text{ e } \beta < 0 \quad (3)$$

In this equation (1)  $P$  is the product,  $p$  is the rate of growth of product in various regions,  $W$  is the matrix of distances,  $b$  is the convergence coefficient,  $\rho$  is the autoregressive spatial coefficient (of the spatial lag component) and  $\varepsilon$  is the error term (of the spatial error component, with,  $\varepsilon = \lambda W\varepsilon + \xi$ ). The indices  $i$ ,  $j$  and  $t$ , represent the regions under study, the neighbouring regions and the period of time respectively.

### 4. EMPIRICAL EVIDENCES FOR NET MIGRATION

Table 1 shows the results of the estimations, with the OLS estimation method, of the equation of net migration (equation 2), at the level of NUTS III of Portugal, and for the years 1991 and 2001 (years that correspond to the Portuguese Census and are unique for demographic statistics with a finer spatial disaggregation). The equation was modified by removal of the variable on wages, since there are no data.

The estimation results confirm that there is no spatial autocorrelation, "spatial lag" or "spatial error" (since the LM tests have no statistical significance) for net migration/population active, and show that for the level of NUTS III and for years considered the evolution of net migration is explained solely by the availability of housing. The positive sign of the coefficient (as expected) means that higher the rate of growth in the number of houses in a region compared with the average of other regions, increased migration of labor to the region. The fact that there is no autocorrelation "spatial lag" or "spatial error" means that the migration balance are or not influenced by net migration or by other factors of the neighboring regions, respectively.

**Table 1:** Results of OLS estimates with "cross section" data subject to spatial effects, with the equation of net migration for the NUTS III and in the years 1991 and 2001

$$(SM / PA)_t = c_0 + \rho(W(SM / PA)) + c_1(r_I - r_E)_t + c_2(D_I - D_E)_t + c_3(A_I)_t + c_4(f_I - f_E)_t + \varepsilon$$

	$c_0$	$c_1$	$c_2$	$c_3$	$c_4$	JB	BP	KB	M'I	LM <sub>I</sub>	LMR <sub>I</sub>	LM <sub>E</sub>	LMR <sub>E</sub>	R <sup>2</sup>	SEE
OLS	0.003 (0.170)	0.048 (1.448)	-0.011 (-0.040)	-0.169 (-0.295)	0.155* (2.165)	5.061	7.491	4.751	1.975	0.034	1.018	0.619	1.602	0.201	0.025

Note: JB, Jarque-Bera test for normality; BP, Breusch-Pagan test for heteroscedasticity; KB, Koenker-Bassett test for heteroscedasticity; M'I, Moran's I; LML, LM test for the component "spatial lag"; LMRL, robust LM test for the component "spatial lag"; LME, LM test for the component "spatial error"; LMRE, robust LM test for the component "spatial error"; \*, statistically significant to 5%; \*\*, statistically significant at 10%; SEE, standard deviation of the estimation.

## 5. EMPIRICAL EVIDENCE FOR CONDITIONAL CONVERGENCE OF PRODUCT, CONSIDERING THE POSSIBILITY THAT THERE ARE SPATIAL EFFECTS

The results concerning OLS estimates of conditional convergence with tests of spatial specification are present in Table 2, which follows.

**Table 1:** OLS estimation results for the equation of absolute convergence with spatial specification tests

$$(1/T)\log(P_{it}/P_{i0}) = \alpha + b\log P_{i0} + \varepsilon_{it}$$

Constant	Coef. b	JB	BP	KB	M'I	LM <sub>i</sub>	LMR <sub>i</sub>	LM <sub>e</sub>	LMR <sub>e</sub>	$\bar{R}^2$	N.O.
-0.052* (-16.333)	0.001* (15.639)	1.819	1.012	1.052	3.074*	92.164*	3.764*	187.805*	98.405*	0.567	4050

Note: JB, Jarque-Bera test; BP, Breusch-Pagan test; KB, Koenker-Bassett test; M'I, Moran's I; LM<sub>i</sub>, LM test for spatial lag component; LMR<sub>i</sub>, robust LM test for spatial lag component; LM<sub>e</sub>, LM test for spatial error component; LMR<sub>e</sub>, robust LM test for spatial error component;  $\bar{R}^2$ , coefficient of adjusted determination; N.O., number of observations; \*, statistically significant to 5%; \*\*, statistically significant to 10%.

This confirms to what has been previously seen in other works, or, in other words, product diverged in Portugal between 1991 and 2001. There are not indications of heteroskedasticity, according to the BP and KB tests. Convergence/divergence in the product will be conditioned by spillover and spatial error effects according to the LM tests.

Table 3 presents the results of the estimates of spillover and spatial error effects.

**Table 3:** ML estimation results for the equation of conditional convergence with spatial effects

$$(1/T)\log(P_{it}/P_{i0}) = \alpha + \rho W_{ij} p_{it} + b\log P_{i0} + \varepsilon_{it}$$

Constant	Coefficient	Spatial coefficient	Breusch-Pagan	$\bar{R}^2$	N.Observations
-0.267 (-0.978)	0.001* (10.227)	0.990* (150.612)	1.958	0.653	4050

Note: \*, statistically significant to 5%; \*\*, statistically significant to 10%; \*\*\*, spatial coefficient of the spatial error model.

The convergence coefficient is more or less the same, but the spatial coefficient confirms the existence of spatial autocorrelation.

## 6. CONCLUSIONS

At the level of NUTS III is the housing stock (number of houses) which affects the mobility of populations. It was concluded, yet, that although there is spatial autocorrelation in terms of overall net migration is not enough to explain their evolution between the different NUTS III.

Based on Census 1991 and 2001, at the NUTS III level, it appears that the Alentejo lose population and Algarve wins. Something similar we can see for the difference between the internal growth rates and external average, of the product, and of the number of houses. Evolutionary trends almost inverse follow the average unemployment rates and average farm employment. There are however some cases different, particularly the Grande Lisboa which usually in the variables analyzed does not follow the trend of the other regions of the coast, thus showing some signs of congestion.

At parish level, considering the analysis of the data and the estimation results previously carried out, it can be seen that product is subject to positive spatial autocorrelation and that the product diverged between 1991 and 2001 in Portugal. This is a preoccupant situation, because we are the population all in the littoral and no people in the interior.

As final conclusion, we confirm with the different ways the same conclusions, in other words, we have net migration to the littoral and we have divergence between the continental regions.

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